

# **HEIGHT-ADJUSTABLE HINGE FOR A LIQUID CRYSTAL DISPLAY**

## **1 BACKGROUND OF THE INVENTION**

### **2 1. Field of the Invention**

3       The present invention relates to a hinge, and more particularly to a hinge  
4       which is able to provide height-adjustable feature to a liquid crystal display  
5       (LCD) to provide more convenient observation alternatives.

### **6 2. Description of Related Art**

7       As well known in the art, a hinge is provided between two objects so as  
8       to provide a pivotal relationship between the two objects. Examples can be seen  
9       everywhere in our lives. A common example is the LCD of a computer, wherein  
10      the LCD pivots about a central axis so that various observation angles are  
11      provided to different operators. However, in order to protect the LCD from  
12      damage, the pivotal angle of the LCD is limited within a certain range. That is,  
13      the pivotal movement of the LCD is stopped when the LCD is pivoted to a  
14      critical angle. Consequently, if the operator is shorter than average or is a child,  
15      the mere pivotal movement of the LCD can not provide satisfactory service to  
16      meet the requirements.

17      To overcome the shortcomings, the present invention tends to provide an  
18      improved hinge to mitigate the aforementioned problems.

## **19 SUMMARY OF THE INVENTION**

20      The primary objective of the present invention is to provide an improved  
21      hinge that not only enables the display to pivot but also allows the display to be  
22      raised and lowered.

1 Another objective of the present invention is to provide a hinge having a  
2 positioning device so that when the display is pivoted, the positioning device is  
3 able to protect the display from damage through excessive travel.

4 Other objects, advantages and novel features of the invention will  
5 become more apparent from the following detailed description when taken in  
6 conjunction with the accompanying drawings.

#### 7 BRIEF DESCRIPTION OF THE DRAWINGS

8 Fig. 1 is an exploded perspective view of the hinge of the present  
9 invention;

10 Fig. 2 is a perspective view showing the hinge of the present invention in  
11 assembly;

12 Figs. 3 and 4 are side views showing that the display attached to the  
13 hinge of the present invention is raised and lowered by the use of the hinge;

14 Fig. 5 is a side view showing that the display is pivoted relative to a  
15 fixture of the hinge of the present invention; and

16 Fig. 6 is a schematic view showing the application of the hinge to a back  
17 of the display.

#### 18 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

19 With reference to Fig. 1, the hinge in accordance with the present  
20 invention includes a base (1), a first arm (2), a second arm (3), a fixing seat (4)  
21 and a bracket (5).

22 The base (1) includes two upright walls (11) each with a first hole (15)  
23 and a second hole (16) aligned with the first and second hole (15,16) of the other

1 upright wall (11) respectively, a shaft (12) securely sandwiched between the two  
2 upright walls (11) and a fixing plate (13) integrally extending out between the  
3 two upright walls (11) and having a fixing hole (131) defined therein. A saddle  
4 (14) having two positioning recesses (141) is defined in a side face of each of the  
5 two upright walls (11).

6 The first arm (2) is composed of two arms each having a first and a  
7 second pivot hole (21,21') defined in two distal ends thereof and a bridge (22)  
8 securely connecting the two arms together.

9 The second arm (3) is composed of two arms each having a first and a  
10 second pivot hole (31,31') defined in two distal ends thereof and a bridge (32)  
11 securely connecting the two arms together and defining in a side face thereof at  
12 least one (two are shown in this preferred embodiment) connecting hole (33). A  
13 limiting block (34) is formed on a side face of each of the two arms of the second  
14 arm (3) to correspond to the saddle (14) of the base (1).

15 The fixing seat (4) has two pairs of through holes (41,41') defined in a  
16 top portion and a bottom portion of the fixing seat (4) and two positioning  
17 wedges (42) formed on a side face of the fixing seat (4) between the two pairs of  
18 through holes (41,41').

19 The bracket (5) is elongated and has two extensions (51) extending out  
20 from a distal end of the bracket (5) to correspond to the fixing seat (4).

21 With reference to Fig. 2 and still using Fig. 1 for reference, when the  
22 hinge of the present invention is in assembly, the two first pivot holes (21) of the  
23 first arm (2) are aligned with the two first holes (15) of the two upright walls (11).

1 and then a retaining device such as screw and nut combination is used to secure  
2 the engagement between the first arm and the base (1). The first pivot holes (31)  
3 of the second arm (3) are aligned with the second holes (16) of the two upright  
4 walls (11) and then a first washer assembly (7) is provided between the two arms  
5 of the second arm (3) and a side face of each of the two upright walls (11) to  
6 secure engagement between the second arm (3) and the base (1). After the  
7 engagement between the first arm (2) and the base (1) and between the second  
8 arm (3) and the base (1), it is noted that the first arm (2) and the second arm (3)  
9 are pivotal relative to the base (1).

10       Thereafter, at least one (two are shown) spring (6) is provided and has a  
11 first end thereof connected to the connecting hole (33) of the second arm (3) and  
12 a second end thereof connected to the fixing hole (131) of the fixing plate (13) of  
13 the base (1). Then, the second pivot holes (21') of the first arm (2) are aligned  
14 with the first pair of through holes (41) of the fixing seat (4) and the second pivot  
15 holes (31') of the second arm (3) are aligned with the second pair of through  
16 holes (41') of the fixing seat (4). A retaining device such as a screw and a nut  
17 combination is used to secure engagement between the fixing seat (4) and the  
18 first arm (2) and the engagement between the fixing seat (4) and the second arm  
19 (3). After the engagement between the first and second arms (2,3) and the fixing  
20 seat (4), it is learned that the first and second arm (2,3) is pivotal relative to the  
21 fixing seat (4). Then a second washer assembly (8) is applied to secure  
22 engagement between the fixing seat (4) and the bracket (5). That is, a bolt is  
23 extended through a side face of the fixing seat (4) and a side face of the extension

1 (51) and into a series of washers. Eventually, a nut is provided to secure the  
2 engagement between the fixing seat (4) and the bracket (5). Due to the provision  
3 of a stop (81) formed on one of the washers and corresponding to the positioning  
4 wedges (42), pivotal movement of the second washer assembly (8) is limited.

5 With reference to Figs. 3 and 4, it is noted that the first arm (2) and the  
6 second arm (3) are arranged in parallel and the first arm (2) is on top of the  
7 second arm (3). When a display (A) securely attached to the bracket (5) is about  
8 to be moved upward or downward, due to the pivotal engagement between the  
9 bracket (5) and the fixing seat (4) and the pivotal engagement of the first and  
10 second arm (2,3) with the base (1), the bracket (5) together with the display (A)  
11 is able to be moved to different latitudes. Besides, when the display (A) is moved  
12 downward, the spring (6) is extended so that when the display (A) is about to be  
13 moved upward, the recovery force stored in the spring (6) is released, which  
14 helps the operator use less effort to move the display (A) upward. Still, when the  
15 display (A) is moved upward and downward, the limiting block (34) moves back  
16 and forth in the positioning recesses (141) of the saddle (14).

17 With reference to Fig. 5, again, because the bracket (5) is pivotally  
18 connected to the fixing seat (4), the bracket (5) together with the display (A) is  
19 able to pivot relative to the fixing seat (4) such that the display (A) is able to have  
20 angle adjustment ability. While the display (A) angle is being adjusted, the stop  
21 (81) moves between the two positioning wedges (42), which limits the angle  
22 adjustment of the display (A) so that the display (A) is protected from damage.

23 With reference to Fig. 6, it is noted that when the hinge of the present

1 invention is in application to support the display (A), the base (1) is securely  
2 mounted on a support (not numbered and shown in dotted lines). The hinge has,  
3 in total, one bracket (5), two fixing seats (4) pivotally connected to two distal  
4 ends of the bracket (5), two first arms (2), two second arms (3), and two bases (1)  
5 respectively and pivotally connected to one first arm (2) and one second arm (3).  
6 Furthermore, the quantity of the spring (6) that is provided between the second  
7 arm (3) and the base (1) can be increased to two. The first washer assembly (7)  
8 may be sandwiched only by one upright wall (11) and one side face of the second  
9 arm (3). The second washer assembly (8) may be provided on only one side face  
10 of the fixing seat (4) to provide the necessary friction to support the display (A)  
11 attached to the bracket (5).

12         It is to be understood, however, that even though numerous  
13 characteristics and advantages of the present invention have been set forth in the  
14 foregoing description, together with details of the structure and function of the  
15 invention, the disclosure is illustrative only, and changes may be made in detail,  
16 especially in matters of shape, size, and arrangement of parts within the  
17 principles of the invention to the full extent indicated by the broad general  
18 meaning of the terms in which the appended claims are expressed.